IN THE CLAIMS:

Listing of Claims:

1. (Currently Amended) A differential limiting control apparatus for a vehicle having a clutch unit interposed between one rotational shaft and ~~the other~~ another rotational shaft for variably changing a driving force transmission between the one rotational shaft and the other rotational shaft, comprising:

a feedback control clutch torque computing unit for computing the clutch torque of the clutch unit based on vehicle behaviors through a feedback control,

a feed forward unit for computing the clutch torque based on said behaviors through a feed forward control,

a tire diameter difference computing unit for computing a diameter difference of a tire, and

a clutch torque computing unit for computing [[said]] a final clutch torque by changing a ratio of said clutch torque obtained through the feedback control and the feed forward control according to the diameter difference of the tire so as to effectively suppress a wheel slippage by adequately setting a ratio of control values between the feed forward and feedback control.

2. (Original) The differential limiting control apparatus as set forth in Claim 1, wherein:

the feedback control clutch torque computing unit has a target differential speed setting unit for setting a target differential speed between the one rotational shaft and the other rotational shaft, an actual differential speed detecting unit for detecting an actual differential speed between the one rotational shaft and the other rotational shaft, and a clutch torque computing for computing an engagement force of the clutch unit by obtaining a deviation between the target differential speed and the actual differential speed with a switching function by using at least a polarity related to an integral term of the deviation and by applying a sliding mode control.

3. (Original) The differential limiting control apparatus as set forth in Claim 1, wherein:

the clutch torque computing unit reduces the ratio of said clutch torque obtained through the feed forward control as the diameter difference of the tire increases.

4. (Original) The differential limiting control apparatus as set forth in Claim 1, wherein:

the tire diameter difference computing unit calculates the diameter difference based on at least an actual differential speed between the one rotational shaft and the other rotational shaft

when the vehicle is running substantially straight and when a slippage is so difficult to be detected between a road and wheels.

5. (Original) The differential limiting control apparatus as set forth in Claim 1, wherein:

the clutch unit is interposed between a front axle and a rear axle.

6. (Original) The differential limiting control apparatus as set forth in Claim 2, wherein:

the clutch unit is interposed between a front axle and a rear axle.

7. (Original) The differential limiting control apparatus as set forth in Claim 3, wherein:

the clutch unit is interposed between a front axle and a rear axle.

8. (Original) The differential limiting control apparatus as set forth in Claim 4, wherein:

the clutch unit is interposed between a front axle and a rear axle.

9. (Original) The differential limiting control apparatus as set forth in Claim 1, wherein:

the clutch unit limits a differential action of a differential interposed between left and right wheel.

10. (Original) The differential limiting control apparatus as set forth in Claim 2, wherein:

the clutch unit limits a differential action of a differential interposed between left and right wheel.

11. (Original) The differential limiting control apparatus as set forth in Claim 3, wherein:

the clutch unit limits a differential action of a differential interposed between left and right wheel.

12. (Original) The differential limiting control apparatus as set forth in Claim 4, wherein:

the clutch unit limits a differential action of a differential interposed between left and right wheel.

13. (Currently Amended) A differential limiting control method for a vehicle having a clutch unit interposed between one rotational shaft and ~~the other~~ another rotational shaft for variably changing a transmitting route of a driving force between the one rotational shaft and the other rotational shaft, comprising the steps of:

computing the clutch torque of the clutch unit based on behaviors of a vehicle through a feedback control,

computing [[said]] the clutch torque based on said behaviors through a feed forward control,

computing a diameter difference of tires, and

computing a final clutch torque by changing [[said]] a ratio of the clutch torque obtained through the feedback control and said clutch torque obtained through the feed forward control according to the diameter difference of the tire so as to effectively suppress a wheel slippage by adequately setting a ratio of control values between the feed forward and feedback control.

14. (Original) The differential limiting control method as set forth in Claim 13, wherein:

the feedback control clutch torque computing step has a target differential speed setting step for setting a target differential speed between the one rotational shaft and the other rotational shaft, an actual differential speed detecting step for detecting an actual differential speed between the one rotational shaft and the other rotational shaft, and a clutch torque computing step for computing an engagement force of the clutch unit by obtaining a deviation between the target differential speed and the actual differential speed with a switching function by using at least a polarity related to an integral term of the deviation and by applying a sliding mode control.

15. (Original) The differential limiting control method as set forth in Claim 13, wherein:

the clutch torque computing step reduces the ratio of said clutch torque obtained through the feed forward control as the diameter difference of the tire increases.

16. (Original) The differential limiting control method as set forth in Claim 13, wherein:

the tire diameter difference computing step calculates the diameter difference based on at least an actual differential speed between the one rotational shaft and the other rotational shaft when the vehicle is running substantially straight and when a slippage is difficult to be detected between the road and said wheel.

17. (Original) The differential limiting control method as set forth in any of Claim 13, wherein:

the clutch unit is interposed between a front axle and a rear axle.

18. (Original) The differential limiting control method as set forth in Claim 14, wherein:

the clutch unit is interposed between a front axle and a rear axle.

19. (Original) The differential limiting control method as set forth in Claim 15, wherein:

the clutch unit is interposed between a front axle and a rear axle.

20. (Original) The differential limiting control method as set forth in Claim 16, wherein:

the clutch unit is interposed between a front axle and a rear axle.

21. (Original) The differential limiting control method as set forth in Claim 13, wherein:

the clutch unit limits the differential action of a differential interposed between left and right wheel.

22. (Original) The differential limiting control method as set forth in Claim 14, wherein:

the clutch unit limits the differential action of a differential interposed between left and right wheel.

23. (Original) The differential limiting control method as set forth in Claim 15, wherein:

the clutch unit limits the differential action of a differential interposed between left and right wheel.

24. (Original) The differential limiting control method as set forth in Claim 16, wherein:

the clutch unit limits the differential action of a differential interposed between left and right wheel.

25. (New) The differential limiting control apparatus as set forth in Claim 1, wherein the feed forward unit computes the clutch torque based on a throttle opening.

26. (New) The differential limiting control apparatus as set forth in Claim 1, further comprising a brake switch, and

when an ON signal is inputted from the brake signal, the clutch torque obtained through the feed forward control is made to be zero.

27. (New) The differential limiting control method as set forth in Claim 13, further comprising:

computing said clutch torque through the feed forward based on a throttle opening control.

28. (New) The differential limiting control method as set forth in Claim 13, when an ON signal is inputted from a brake signal, the clutch torque obtained through the feed forward control is made to be zero.

29. (New) The differential limiting control apparatus as set forth in Claim 1, wherein the final clutch torque (T lsd) involves the following equation:

$$T_{lsd} = Rtr \cdot T_{lsdff} + (1-Rtr) \cdot T_{lsdfb}$$

with Rtr representing a tire diameter difference constant;

T lsdff representing clutch torque provided through the feed forward control; and

T lsdfb representing clutch torque provided through the feedback control.

30. (New) The differential limiting control method as set forth in Claim 13, wherein the final clutch torque (T lsd) involves the following equation:

$$T_{lsd} = Rtr \cdot T_{lsdff} + (1-Rtr) \cdot T_{lsdfb}$$

with Rtr representing a tire diameter difference constant;

T_{lsdff} representing clutch torque provided through the feed forward control; and

T_{lsdfb} representing clutch torque provided through the feedback control.